Once again, 2022 was a year of action, impact and collaboration for the eScience Center. Action, because we are well on our way to achieving our strategic priorities for 2021-2025, both in our research projects and our training programme. Impact, because this year we worked hard to contribute to making software sustainable and FAIR on a national and international level, with the launch of the Research Software Directory (RSD), writing the draft of the Amsterdam Declaration on Funding Research Software Sustainability (ADORE) and finalizing national guidelines for software management plans. Collaboration, because without our many partners in the academic world and the dedication of our fantastic team we could not have achieved these milestones.

In 2022, we also achieved a milestone anniversary by turning 10 years old! We had a wonderful day celebrating our anniversary with our colleagues and partners. It was great to see such a passionate community join in celebration of our collective achievements over the past years.

**Joris van Eijnatten**
General Director

### OUR 2022 TIMELINE

- **Launched our Fellowship Programme**
- **Quantum Application Lab opens!**
- **Research Software Directory launched**
- **International Funders Workshop: The Future of Research Software**
- **eScience Center anniversary: 10 years of research software collaboration**
- **25 new eScience Center projects awarded**
- **We become a founding member of the Research Software Alliance**
- **FAIR Principles for research software published**
- **The Practical Guide to Software Management Plans becomes available**
Projects resulting from Calls for Proposals
Each year, we invite researchers to respond to our calls for proposals to collaborate on interesting research projects in all scientific domains. Researchers benefit from our expertise in developing and advising on research software crucial to conducting research.

7 Calls for Proposals
43 Awarded projects
30 Projects from last year’s calls
30 Projects completed

Software Stats
Our Research Software Directory contains a collection of all the open-source software packages we’ve helped create. Here are our numbers to date:

202 Software packages
168 Software releases
214 Contributors to our software

Founding consortium partner for the Quantum Applications Lab
We are proud to be a founding consortium partner of the Quantum Application Lab (QAL) together with our partners below. The QAL supports the development of applications of quantum computing in different fields.

This initiative was featured in 28 articles, 12 of them mentioning the eScience Center’s contribution.
Social Sciences & Humanities

**MEXCA**
Have you ever watched the emotions conveyed by politicians and wondered about their impact on public perception? Learn how this tool, created in collaboration with the University of Amsterdam, combines multimodal analysis with AI to understand emotions.

*Lead RSE: Malte Lüken*

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Natural Sciences & Engineering

**Passing XSAMS**
In this project, we collaborated with Eindhoven University of Technology to make better and more efficient devices that use plasma to produce solar fuels, which can be used as clean energy sources. Learn how the tools developed in XSAMS helps scientists in the field of low-temperature plasma physics share their findings and collaborate more effectively.

*Lead RSE: Stefan Verhoeven*

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Environment & Sustainability

**eWaterCycle II**
The goal of the project, developed together with Delft University Technology and Utrecht University, is to enable the collaborative development of a global hydrological model through the combination of the existing local models. This project aims to create a model that predicts flood and drought events 10 days in advance, worldwide and in high resolution, using satellite data. This model will help people, governments, and companies prepare and thus saving lives.

*Lead RSE: Peter Kalverla*

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Life Sciences

**ReSurfEMG**
Together with the University of Twente and with support from a Lorentz Center workshop, we developed a software tool for automated analysis of diaphragmatic electromyogram (EMG) signals. This tool solves the problem that noise picked up from other muscles make it difficult to analyze diaphragm signals, which has the potential to improve research and patient care.

*Lead RSE: Candace Makeda Moore*
OPEN AND FAIR RESEARCH SOFTWARE

Share your research software with the world

We created the Research Software Directory (RSD) to stimulate the reuse and sustainability of research software and encourage proper citation to ensure researchers and research software engineers (RSEs) get credit for their work. Since launching the RSD on 22 November 2022, it has drawn substantial interest in Europe, North America and beyond.

Why use this free open-source, online platform?
- Showcase the impact that research software has on research and society.
- Ensure other researchers can find research software relevant to their work and reuse it.
- Encourage proper citation of research software in other research outputs.
- Share metadata about research software as part of the open science ecosystem.

Today, software is the indispensable research instrument. That is why, together with the Dutch Research Council (NWO), we launched the National Guidelines for Software Management Plans. Researchers now have a way to manage software as one of the core outputs of their research!

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We received overwhelming support on social media:

- Views: 13.5K
- Engagements: 519
- Link clicks: 123

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FAIR principles for Research Software published in Nature Scientific Data!

After two years of hard work and the involvement of more than 500 contributors from around the globe, the FAIR Principles for Research Software (FAIR4RS) has been released and published in Nature Scientific Data! FAIR4RS is the result of a joint working group set up by the Research Software Alliance (ReSA), Research Data Alliance (RDA) and FORCE11. As co-authors of this text, we are proud to have contributed to promoting, advancing and ensuring the findability, accessibility, interoperability and reusability of research software.
The International Funders Workshop, held in November 2022, co-hosted with the Research Software Alliance (ReSA) was a great success! Representatives from more than 40 funding organizations (national, international and philanthropic) across the globe gathered to discuss how to support research software. At the workshop, these experts provided feedback on principles and recommendations in the draft Amsterdam Declaration on Funding Research Software Sustainability (ADORE.software) to help shape it into a declaration that funding organizations can proudly sign!

Setting the international stage for funding sustainable research software

Other collaborations and conferences
We were also present, participated and presented in numerous other conferences and meetings! See just some of our activities below:

- Synergy Conference
- Visit from Bangledesh
- Open Science Festival 2022
- RS-DAT Live Demo
- ICT.Open 2022
- Science Europe Open Science Conference 2022
Our Community

**Employee stats**
We pride ourselves in the diversity of our staff. Our employees come from all around the globe and bring with them a wealth of experience from operations to engineering and research.

- **102** Total employees
- **27** New employees
- **6** Interns supervised
- **32** Women
- **70** Men

Our employee satisfaction survey, held in 2022, indicated that our employees are generally very satisfied and show an extremely high degree of loyalty to our organization!

**Fellowship Programme**
In 2022, we successfully launched our Fellowship Programme with 17 eScience Center Fellows from Dutch research organizations. Through this network of colleagues we aim to create a growing network of research software ambassadors in academia.

- **"Having the Fellowship gave me the momentum to create a roadmap of how we can achieve better research software at my university."**
  - Pedro Hérnandez-Serrano

- **"For me, the Fellowship Programme is something that aligns with my tenure track activities. It’s also an opportunity to enter a community that I find very valuable."**
  - Claudiu Forgaci

- **"My experience as an eScience Center Fellow is generally really positive. I got much more out of this than I expected. I’m really happy with the collaboration so far. It’s very bidirectional."**
  - Jan de Wit
Trainings and workshops continue to be a hot ticket!

"Forget about Jupyter Notebooks – showcase your research using Dashboards" by Stef Smeets, gained 29K views and was even translated into Chinese!

Social media numbers

Social media is one of the many bridges we use to connect with our partners.

The theme for 2022 was growth!

In 2022 we had:

- 17 Digital skills workshops
- 2 Externally paid workshops

with

- 400 Participants in total
- 24 Participants on average

We currently have 42 enthusiastic colleagues on the blogging team.

Our blogs

In 2022 we published:

- 35 Blogs
- 18,198 Reads

Our most used hashtag?

#FundResearchSoftware

281 messages using our hashtag

Top posts

- Netherlands eScience Center
  @ElsevierCenter
  Research software plays a crucial part in academic research, but its availability & reuse are still limited.
  That’s why we are proud to announce the launch of the Research Software Directory (RSD), an online platform to promote the visibility, reuse & impact of research software.

3:03 PM - Oct 21, 2022

- Our library and 3 others

New followers

- 729
- 316

Followers in total

- 434
- 508

Views

- 329k
- 42

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**WHAT IS NEXT FOR US?**

**ADORE.software declaration ready for signatories in 2023**

The draft Amsterdam Declaration on Funding Research Software Sustainability (ADORE.software), initiated from the International Funders Workshop and now led by ReSA, will be finalized and ready for signing by funding organizations around the globe in late-2023.

Research software is a critical part of research

The Amsterdam Declaration on Funding Research Software Sustainability is setting the future international agenda and comprehensively changing the way funders deal with research software.

**Sustainability at the forefront of our minds**

We will continue the development and implementation of an environmental sustainability policy, which includes attention for ‘green computing’.

**Expanding our training activities**

We will continue to expand our training activities wherever possible, including through our new national network, Research Software Training NL. The goal of this new platform is to help researchers and research supporters share knowledge and best practices concerning research software.
The eScience Center is divided into four scientific sections where our research software engineers carry out our core activities in project collaborations. See what their plans are for 2023!

Environment & Sustainability section

Environment & Sustainability covers such disciplines as ecology, hydrology, climate research, earth observation and agriculture. In these disciplines, machine learning (ML) is gaining more traction, requiring expertise in working with spatiotemporal data, which we are well positioned to offer.

Key highlight of plans for 2023:

- Invest in technical expertise in areas such as multi-scale modeling, HPC for climate research, data management and AI in line with current research into digital twins.
- Pursue collaborations in relevant projects via Horizon Europe in addition to currently engaged initiatives such as LTER-LIFE which aims to create a state-of-the-art infrastructure to predict how changes in climate and other human-induced pressures affect ecosystems and biodiversity.
- Position ourselves as a hub of expertise for Remote Sensing data handling, computing and analytics.

Life Sciences section

The Life Sciences section primarily focuses on problems coming from molecular biology, genomics, pharmacology and medical data processing. Their work revolves around combinations of big data handling techniques, machine learning approaches and automated workflow technologies.

Key highlight of plans for 2023:

- Currently, a particular challenge in this field relates to connecting lab results to information from the outside world to translate and interpret data meaningfully. For this reason, we will further develop expertise in enhancing data interoperability.
- Participate in workshops and conferences to promote tools through policymaker groups to help practitioners apply digital technologies in their daily work.
Natural Sciences & Engineering section
The Natural Sciences & Engineering section of the eScience Center mainly covers high-energy physics, material sciences, civil engineering and astrophysics.

Key highlight of plans for 2023:
- Further improve their tools to easily adapt the performance of GPUs to their specific applications and explore applications of quantum computing in different disciplines such as radio astronomy and quantum chemistry.
- Continue to develop a generic tool for explainable AI and aim to help the applied mathematics community translate advances into reusable tools.
- Contribute to research in clean energy production and exploring how the energy grid can best be digitalized, modernized and secured at the national level.
- Develop dedicated teaching materials and contribute to the Thematic Digital Competence Centre (TDCC).

Social Science & Humanities section
The Social Science & Humanities section of the eScience Center serves a diverse range of disciplines, including law, economics, political and behavioral sciences, history, philosophy, literature, and linguistics. The section focuses on text and literature analysis and natural language processing (NLP) but also explores the application of other technologies such as machine learning and remote sensing in heritage projects.

Key highlight of plans for 2023:
- Further develop expertise in network analysis and combining different types of data and technologies.
- Develop training programs for SSH in network analysis and promote participation in conferences and field trips to present tools and expertise to researchers.